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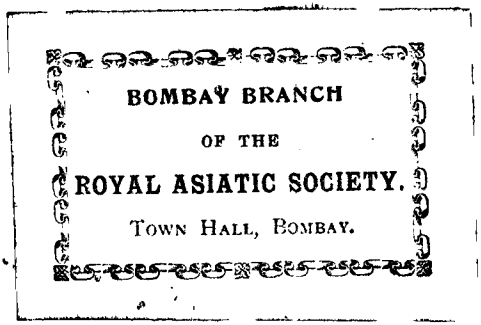

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A

LECTURE

ON THE

GEOGRAPHY OF PLANTS.

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BY JOHN BARTON.

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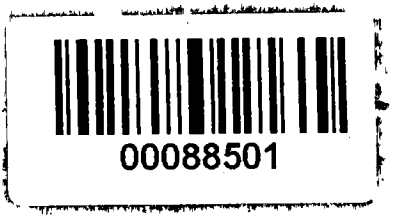
THE outlines of the following Lecture were delivered before the members of the Mechanics' Institute at Chichester. It was illustrated by reference to maps, and, indeed, would be scarcely intelligible without such reference; I have therefore added some maps of the principal divisions of the world, in which the names of plants are substituted for the names of places. Cultivated plants are distinguished by Roman letters, those growing wild by Italics. It must not be supposed, however, that these plants grow exclusively in the very spot where their names are marked; the greater number of those native to the south of Europe, for instance, are found alike in Spain, Italy, and Turkey. I have, notwithstanding, endeavoured to place each name in a situation as accurately specific as the nature of the subject admits; thus, Wheat, Barley, and Oats, might be inserted indiscriminately as cultivated in any part of England; but I have placed Oats in Lincolnshire, Barley in Norfolk, Wheat in Suffolk and Essex, because the soil in each of these counties is better adapted to the sort there inserted than to other kinds of Grain.

Stoughton, June 11th, 1827.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A LECTURE

ON THE

GEOGRAPHY OF PLANTS.

THE Geography of Plants has much engaged the attention of naturalists of late years, particularly those of the continent; and a great number of valuable observations have been collected by their united researches. It is a subject which appears well calculated to interest every one who has a taste for the study of nature; but while wrapped up in the technical terms of botany, as well as in a foreign or dead language, the number is comparatively small of persons who are qualified to participate in the pleasure which it is capable of affording. I shall for the most part confine my attention to those plants whose names, or the names of some of their productions, are likely to be known to every one; either the plants themselves being

cultivated in our gardens, or their productions employed by the apothecary, the dyer, or the cabinet-maker.

Scarcely fourteen hundred species of plants appear to have been known and described by the Greeks, Romans, and Arabians. At present, more than three thousand species are enumerated as natives of our own island; and the researches of botanists in other parts of the world, have extended our knowledge of the vegetable kingdom to more than forty thousand species*. Of this vast number, comparatively few belong indiscriminately to all climates and situations; none, perhaps, excepting some mosses and other obscure plants, which appear to require for their existence only an abundance of shade and moisture †. This limitation of particular plants to certain latitudes, is undoubtedly connected with certain peculiarities in their internal structure; though, for the most part, we are unable to discover in what those peculiarities consist. Independently, however, of the restriction thus imposed by the climate of every place on the nature of its vegetable productions,

* Humboldt, de Distributione Geographica Plantarum, secundum cœli temperiem et altitudinem montium Prolegomena, p. 21.

† Humboldt, Ideen zu einer Geographie der Pflanzen, p. 11.

each of the great divisions of the earth appears to have given birth to a set of plants distinct from those of other parts. Thus, a large proportion of the trees and plants growing wild in the western hemisphere are unlike those of the eastern hemisphere in the same latitude. The vegetable productions of the Cape of Good Hope are unlike those of the south of Europe, though the climate in these two situations is little dissimilar. The plants of the East Indian islands form another distinct class; those of China and Japan another; those of New Holland again another. We are even assured that the little island of St. Helena contains a set of plants peculiar to itself, not one of which is to be found on the neighbouring western shore of the continent of Africa*. The plants originally belonging to one part of the world, when removed to another enjoying a similar climate, often appear to flourish as well as in their native soil. Thus the Potatoe, a native of South America, which was brought to England by Sir Walter Raleigh in the reign of queen Elizabeth, grows as well here as the Turnip, the Carrot, or the Cabbage, which are natives of

* Brown: Appendix to Tuckey's Narrative of an Expedition to the Congo River, p. 475.

Great Britain. In like manner do the Sugar-cane and the Coffee-tree flourish in the West Indies, though not originally produced there, but transplanted—the Sugar-cane from China, the Coffee-tree from Arabia.

It will be convenient to begin our survey of the vegetable kingdom from the colder regions of the earth, and to proceed gradually towards the warmer. Beyond the Arctic Circle, the number of plants is extremely limited. Captain Ross, speaking of a tribe of Esquimaux that he met with on the shores of Baffin's Bay, says: "Their knowledge of wood seemed to be limited to some Heath * of a dwarfish growth, with stems no thicker than the finger. Accordingly, they knew not what to think of the timber they saw on board the ship; and so little notion had they of cloth, or any kind of vegetable texture, that, when presented with a shirt, they inquired of what animal's skin it was made." On the shores of Hudson's Bay, it is said that no trees are found north of latitude 60°. In Europe, however, vegetation extends considerably further. A great part of Sweden, Norway, and the north of Russia, is covered with forests of *Fir*; and from these countries we derive our

* A plant having some resemblance to *Heath*, I presume; not a true *Erica*.

best deal timber. The yellow deal, which is most valued, is the wood of the *Silver Fir**; white deal of the *Spruce Fir*†. The *Scotch Fir*‡ (the only species of the Fir tribe a native of Great Britain) yields *turpentine*, *pitch*, *tar*, and *rosin*. Turpentine flows naturally from the trunk of the tree, as gum does from the Plum-tree; but the process is accelerated by cutting a hole in the wood near the ground, and collecting the turpentine beneath. When turpentine is distilled with water, the *oil of turpentine* comes over, and a substance is left behind well known by the name of rosin. Tar is procured by heating billets of the wood in a sort of rude oven: the tar sweats out, and is collected in a reservoir below. Tar is converted into pitch, by boiling till it acquires a thicker consistence.

In no part of the world has the distribution of plants been more carefully observed than in Norway and Lapland. The trees which are there found to approach nearest the limit of perpetual snow are the *Dwarf Birch*§ and *Dwarf Willow*‖, if they can be properly denominated trees; the Dwarf Birch seldom exceeding two or three feet in height, and the

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* Pinus Picea. † Pinus Abies. ‡ Pinus sylvestris.
§ Betula nana. ‖ Salix herbacea.

Dwarf Willow being still smaller! so small, indeed, that half a dozen plants, with their roots, stem, branches, and leaves complete, may be laid out on the page of a duodecimo volume. Even beyond the limit of these trees are found, however, several small plants; and among them one which particularly deserves to be noticed: the *Reindeer Moss*[a], which forms the principal food of the Reindeer, an animal employed by the Laplanders both for drawing their sledges, for food, and for milk. In the winter, when the ground is covered with snow, these sagacious creatures dig with their feet to get at the moss beneath. When boiled in water, this moss affords a nutritious jelly, which has been employed as a remedy in consumptive complaints.

Next after the Dwarf Birch and Dwarf Willow come the *Common Birch*[b], the *Mountain Ash*[c], and the *Scotch Fir*, with two or three other species of willow; then a species of alder, which has been called the *Cold Alder*[d], from its peculiar place of growth, not being found south of latitude 60°; the *Bird Cherry*[e] and the *Aspen*[f], the *Gooseberry* and the *Raspberry*. Still travelling towards the south, we arrive

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[a] Lichen Islandicus. [b] Betula alba. [c] Sorbus aucuparia.
[d] Alnus incana. [e] Prunus Padus. [f] Populus tremula.

successively at the northern limit of the *Ash*, the *Oak*, and the *Beech* *. The northern limit of the Oak has been traced throughout Europe. At Drontheim, in Norway, on the coast of the Atlantic Ocean, this tree is found in latitude 63°; in the eastern part of Europe, on the confines of Asia, it ceases to grow in latitude 57½° †; a remarkable proof of the superior mildness of the climate on the western shore of the old continent, as compared with that of the interior. I say of the *western* shore; for it is by no means true, as generally supposed, that the climate of the sea-coast is *universally* milder than that of the interior. If we pursue the limits of vegetation through Asia to the eastern extremity of the continent, we shall find the cold little, if any thing, diminished, as we approach the shores of the Pacific Ocean. The Oak languishes on the banks of the Argoun‡, towards the east of Asiatic Russia, in the latitude of London, eight hundred miles nearer to the equator than the point at which it ceases to grow on the opposite shore of the continent. At Pekin, in China,

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* Wahlenberg: Flora Lapponica.

† Von Buch's Travels in Norway and Sweden. Humboldt, Prolegomena, p. 134. See the map of Europe.

‡ Malte Brun: Précis de la Géographie Universelle, tom. iii. p. 356.

situated only fifty miles from the sea-coast, (in the latitude of the South of France, where orange-trees grow without protection in the open air,) the severity of the winter's cold far exceeds that experienced in any part of Great Britain, and falls short only two or three degrees of that at North Cape, the furthest extremity of Europe *. When we speak of the mildness of a maritime climate, we must therefore keep in mind that the expression applies only to the western, not to the eastern shores of the continent.

It is easy to comprehend why the neighbourhood of the sea, in countries situated far north, should tend to render the climate milder, while in the tropical regions it moderates the intensity of the heat, since it is known that the temperature of the ocean varies much less than that of the land; the waters from the equator being continually mixed with those of the Polar regions by the current of the *gulf-stream*. Why the inhabitants of the eastern shore do not enjoy this advantage, as well as those of the western shore of the continent, is in part explained by the prevalence of westerly winds in these latitudes; a westerly wind bringing with it the warm and humid atmosphere of the At-

* Humboldt: Des Lignes Isothermes.

lantic to the inhabitants of Iceland and of Norway, while it brings the dry and cold atmosphere of Siberia to the inhabitants of Kamchatka and Corea *.

Norway and Lapland enjoy a more temperate climate than any other country in the same latitude. The Scotch Fir there attains to a height of sixty feet in latitude 70°; and at Tornea, at the head of the Gulf of Bothnia, in latitude 66°, the Birches are described by Von Buch as "*magnificent.*" For this superiority of climate, these countries are probably indebted to their peculiar position between four seas, the Atlantic, the Arctic Ocean, the White Sea, and the Gulf of Bothnia. A very curious difference has, however, been observed between the climate of Lapland, lying to the north of the Gulf of Bothnia, and that of Norway, which skirts the shore of the Atlantic and Arctic Oceans. These two countries are separated by a chain of mountains of considerable elevation, which fall abruptly and precipitously towards the sea on their northern and western

* Wahlenberg: Flora Lapponica, xiv. This theory is not, I think, quite satisfactory; or, at least, not quite adequate to explain the facts observed. The proportion of westerly to easterly winds at London, is as 225 to 140.—Howard, on the Climate of London, vol. ii. p. 157.

sides, and descend with a gentle and gradual slope towards the gulf on the other side. Norway, exposed to the moist and temperate atmosphere of the ocean, enjoys a singularly mild winter, but receives little of the sun's rays in summer; partly from the humidity and mistiness of the air, partly from the declivity of the land towards the north. Lapland has a colder winter, but a warmer summer. And, accordingly, it is found that such plants as require only a few weeks of warm weather to bring them to maturity succeed in Lapland, though they will not grow in Norway; while those which are easily killed by a severe frost flourish better in Norway than in Lapland.

For the sake of distinction, that kind of equable climate enjoyed by the countries bordering on the Atlantic has been called the *Island Climate*. It belongs, perhaps, still more strikingly to Ireland and the west of Scotland than to Norway. The other sort of climate, where both the summers are hotter and the winters colder, is called the *Continental Climate;* and as Lapland possesses it in a greater degree than Norway, Russia possesses it in a still greater degree than Lapland. We shall hereafter see that similar differences have been found to prevail between the maritime and inland districts in other parts of Europe.

In the Orkney Islands, off the northern coast of Scotland, no tree is found but the Hazel, which seems to bear the winds of the Atlantic better than either the Scotch or the Spruce Fir. On the coast of Norway, the Hazel and the Spruce Fir terminate nearly at the same point. In Sweden, on the coast of the Baltic, the Spruce Fir is found eight degrees nearer to the Pole than the Hazel. Travelling still towards the east, we lose the Hazel altogether soon after entering the confines of Asia; and it is not met with again in any part of Siberia till we reach the river Amur, near the shores of the Pacific Ocean. Again, in Scotland there are extensive natural woods of the Scotch Fir, but none of the Spruce Fir. On the coast of Norway, the Spruce Fir terminates at latitude 67°, but the Scotch Fir extends to latitude 70°, and the Birch nearly to 71°. In Siberia, the Spruce Fir and the Larch (the latter unknown in Norway and Sweden) extend further to the north than either the Scotch Fir or the Birch*. On the limits between Asia and Europe, the Mountain Ash, Aspen, Black Alder, and Juniper, which in Norway grow under the Polar circle, scarcely reach the 60th degree†.

* Wahlenberg: Flora Lapponica, xiii.

† Decandolle and Sprengel, Elements of the Philosophy of Plants, p. 268.

It happens in Lapland, as in some other parts of the world, that the limits of vegetation are determined more by the form and disposition of the neighbouring mountains than by the latitude. The lines which separate the growth of the different species of plants, are disposed in semicircles round the head of the Gulf of Bothnia; each semicircle rising above the other, as we ascend towards the chain of the *Dofrines*. In the first, or lowest band, the prevailing tree is the Spruce Fir; and to this region, for the most part, the cultivation of corn is confined. Above this grows the Scotch Fir, and above the Scotch Fir the Dwarf Birch and Willow. At the height of 2500 feet, the Dwarf Birch just finds sufficient warmth, about the end of June, to put forth three leaves from each bud, which in a few weeks wither and fall off again; yet this feeble effort of vegetation is found sufficient to continue the life of the plant. It has been observed, that the leaves of the Birch unfold whenever the temperature of the air rises to 52°*: in situations, therefore, where the heat of the warmest month does not rise to this point, it is incapable of growing.

During the short but warm summer of Lapland, vegetation proceeds with extraordinary

* Humboldt: Des Lignes Isothermes, p. 94.

rapidity. Until the middle of May, the ground is covered with snow. About a month later, the rivers begin rapidly to swell, in consequence of the breaking up of the frost. In the beginning of October the ground is hard frozen, and remains so from seven to eight months. Such is the climate of *Enontekeis*, which is situated in the higher and colder part of Lapland. It is not till the month of June that Barley can be sown; yet, in the short space of three months, the fields are ready for the harvest. It has been found, that the cultivation of this grain succeeds wherever the mean temperature during ninety days rises to 48°*.

Notwithstanding its northern and inclement climate, Lapland has to boast of some wild flowers of great beauty. Among these are the *Mezereum*†, the *Yellow* and *White Water Lily*‡, and the *European Globe Flower*§. As we travel southward along the shores of the Baltic, towards Stockholm, we find, for the first time, in *Angermanland*, the *Wood Anemone*, the *Hepatica*, the *Dog Rose*, and the *Sycamore*;—in *Medelpad*, the *Burdock*, and the *Campanula*

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* Wahlenberg: Flora Lapponica, liii.

† Daphne Mezereon.

‡ Nymphæa lutea, and Nymphæa alba.

§ Trollius Europæus.

persicifolia;—in Gastrickeland, the *Cowslip*, the *Guelder Rose*, the *Spiræa filipendula*, and the *Hazel*. At the river *Dal* we find the *Anemone pulsatilla*, the *Hawthorn*, and the *Sloe*. Here we lose the *Hoary* or *Cold Alder*. Several of these plants extend further north on the sea-shore than inland; owing, as it would appear, to the greater mildness of the maritime climate*.

A great part of the Russian Empire, both in Europe and Asia, is covered with forests. In the northern provinces are found principally the various species of *Firs;* the *Scotch* and *Spruce Fir*, the *Larch*, and towards the Ural Mountains the *Siberian Cedar*†. Of deciduous trees, the most abundant is the Birch; and next to this the *Lime-tree*, of whose inner part the common garden-mats are made; and shoes, platted from the rind of the young shoots of this tree, are generally worn by the common people in Russia‡. The Beech, Elm, and Poplar, are chiefly the growth of the southern provinces. Such was the abundance of wood, till of late years, in this country, that the peasants were for the most part allowed to cut down as

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* Wahlenberg: Flora Lapponica, xx.

† Pinus Cembra.

‡ Tooke's View of the Russian Empire, iii. 369.

much as they pleased. It is, indeed, by the produce of the forests, that the people of the northern provinces chiefly live. Their houses are almost universally constructed of timber; wood is every where used for fuel; and they employ a slip of birch-wood, lighted, for a candle. From the ashes of trees, cut down and burnt for this purpose, they obtain *potash*, of which large quantities are annually exported. I have already spoken of the preparation of turpentine, rosin, pitch, and tar; and in situations where a facility of water-carriage exists, large quantities of fir-timber are felled, and floated to the sea to be shipped to other countries. For the purpose of tanning, the Russians employ not merely the bark of the Oak, but of the Birch and Willow. From the wood of the Birch they procure a species of tar, which is used in dressing that kind of leather commonly known by the name of *Russia Leather*, and much employed in book-binding*.

As we pass into Asiatic Russia, we successively lose the Oak, the Hazel, the Ash, the Lime-tree, the Scotch Fir, the Spruce Fir, and the Siberian Cedar; while the Larch extends to the shores of the Arctic Ocean. In the southern parts of Siberia are found wild

* Tooke's View of the Russian Empire, iii. 519.

Tulips, Anemones, two species of *Rhododendron*, and the *Scarlet Lychnis*. To the east of Lake Baikal, the *European Globe Flower* is replaced by the *Asiatic* species*. In Siberia also grow the *Cranberry* and the *Hautboy Strawberry*.

The *Oak*, the *Beech*, and the *Elm* are natives of Great Britain. Each of these trees has its appropriate soil. In the western part of the county of Sussex, we have three distinct belts of country, each strongly marked by the character of its vegetation. To the north we have a strong and deep clay, admirably adapted to the growth of Oak. Then come the chalk hills, where the luxuriant growth of the Beech attests that this tree has found its congenial soil; and the rich plain between the hills and the sea, in the centre of which stands the city of Chichester, abounds in Elms, which refuse to grow on any but the best land †. This tree

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* Trollius Asiaticus.

† I have retained this local observation, which was introduced as likely to interest the natives of Sussex, to whom it was originally addressed.

To the morbid sensibility of poor Cowper, the Beech woods and undulating surface of the South Downs appeared painfully magnificent. "This is a delightful place," he writes from Eartham to his correspondent Lady Hesketh, "more beautiful scenery I have never beheld, nor expect to

is not met with north of Stamford in Lincolnshire. The Elm seen in Scotland and the north of England is the *Wych Elm*, a different spe-

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"behold; but the charms of it, uncommon as they are, "have not in the least alienated my affections from Wes- "ton. The genius of that place suits me better; it has an "air of snug concealment, in which a disposition like mine "feels peculiarly gratified; whereas here I see from every "window, woods like forests, and hills like mountains; a "wildness, in short, that rather increases my natural "melancholy."

The character of the same scenery is thus finely and expressively delineated by a living poet.

"Come, follow me," the beechen groves, the cliffs,
And hollow combs; the blue hills looming far
Beneath the evening sky; and nearer they
Whose airy brows are seen aloft, the while,
With soft and feather'd foot, they tread the earth,
"Come, follow me," their echoes seem'd to say;
And still the streamlet answer'd, "Follow me."

I had no heart to stay: how could I not,
To sight, and sound, enraptur'd as I was,
Surrender up my spirit? On I pass'd,
As every op'ning glade its glittering hues
Fold after fold uplifted. The red leaf,
Sear'd by the Autumn's breath, yet wearing well
A garb to hail the coming winter in;
The silver-mantled beech, beneath whose boughs
Umbrageous, and far-stretching o'er the plain,
Seen in the long blue haze, a province lies;
They all, with voice consentient, seem'd to say,
"Come, follow, gentle wanderer, follow me."

cies, growing in a more straggling form, with pendent branches, and a larger leaf. Its wood is very unlike that of our Elm; more resem-

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I came, I saw the Genius of thy woods;
A misty wreath was on his beechen brow,
A weeping shroud upon his shoulders hung,
Yet beauteous still in tears. But see! the sun
Has touch'd with instant light the landscape's breast:
Out start grey rock, and crag, and forest stain'd
With autumn's tawny hue; a moment more,
And then, quick-gathering all their silver folds,
The congregated vapours high aloft
Rise on their lucid wings. Enough, enough,
That I, a pensive stranger, hither came
Enamour'd of thy vales; mine eye hath drank
Their gorgeous hues insatiate. I have touch'd
With grateful foot, honouring a poet's name,
Thy green and lawny slopes; each jutting rock,
That wears its graceful plume of leafy boughs,
Pass'd not mine eye unnoticed. I have seen,
And seen, delighted still, till my heart sank
O'erpower'd with the scene, those violet hills
In thin and pearly light dissolv'd, beneath
The pure and sapphire sky. ——

—— Away, away!
My lone, my pensive journey still remains,
Far onward to the grave where Collins lies;
And where thy little Naïad, mid the depth
Of groves, and gentlest shadows, and green vales,
Sweet Lavant, guards her lov'd and slender urn.

Lines written at Lavington, by the Rev. J. Mitford.

be called the country of Heaths, producing a far greater number of species than either Europe or Asia; and it is said that not a single species of this genus has yet been found in the New World.

In the wet and springy parts of the district which I have been describing, we meet with many tracts of Bog or Peat Moss, scarcely less sterile than Heath. Occasionally, however, the Cranberry, and some other eatable berries of the same family, as the *Bilberry* and the *Whortleberry**, cover the surface; and the substance of the bog itself furnishes a kind of fuel to the poor inhabitants, after being cut in small square pieces, and piled in stacks to dry. When attentively examined, it is found to consist of vegetable fibres, partially decayed, and compacted by the pressure of the superincumbent portion. Its composition is only to be seen, however, in that part of the bog which lies toward the surface; towards the bottom it takes the appearance of a black and solid mass. In many places the natural soil is covered to a depth of twenty or thirty feet with this substance. The plants by whose decomposition these bogs are formed, appear to be principally

* Vaccinium Myrtillus, V. uliginosum, and V. vitis-idæa.

two or three kinds of moss*. These are almost invariably found growing on the surface; and it appears that each generation, as it dies, forms a soil for that which is to succeed. That a continual growth really takes place, is proved by the gradual filling up of the hollows excavated for obtaining fuel. Much of the surface of Scotland, the north of England, Wales, and Ireland, is covered with these bogs, as well as of that part of the continent of Europe which touches the shores of the German Ocean and the Baltic.

To the south of this barren tract of Heath and Peat Moss, we find an extensive region of remarkable fertility, in which every species of our cultivated grain flourishes. This district, which is for the most part unbroken by hills of any considerable height, comprises the Netherlands, the greater part of France, the middle of Germany, Poland, and southern Russia. The eastern part of this region being comparatively thinly peopled, supplies with corn several other parts of Europe; the produce of the soil being carried down by internal navigation, partly to the ports on the Baltic, partly to those on the Black Sea.

The line which limits the cultivation of *Corn*,

* Principally Sphagnum palustre.

like that which limits the growth of the Oak and other forest trees, extends much further north on the western side, than on the eastern side of the continent. In Norway, *Barley* sometimes ripens, in favourable aspects, under the 70th parallel of latitude. In European Russia, the cultivation of corn scarcely succeeds beyond latitude 60°; and in Kamchatka, the eastern extremity of Asia, this limit descends as low as 51°, the latitude of London. On the eastern shore of the continent of America, the growth of corn does not extend beyond latitude 52°. *Wheat* demands a warmer climate than Barley or Oats. This grain is not found to succeed in the west of Scotland, the summer's sun being insufficient to ripen it. Even in England, the western side of the island appears better adapted to the growth of grass than of corn; and accordingly, it may be observed, in every part of the kingdom, that corn is carried from east to west, while cattle are driven from west to east. All our principal corn counties are situated on the eastern side of the island, from the Lothians, in Scotland, to Kent, the south-eastern county of England. This is, I apprehend, to be attributed in a great measure to the humidity of the climate in those districts bordering on the shores of the Atlantic.

The cultivation of corn does not succeed

better in the Torrid Zone than in the Polar regions. Within the Tropics, *Wheat**, *Barley*, and *Oats* are not cultivated, excepting in situations elevated considerably above the level of the sea. The inhabitants of those countries have, however, some other species of grain, which I shall describe in their place.

We have no satisfactory information respecting the original place of growth of our common kinds of grain. Various statements have indeed been put forth on this subject; but, in the opinion of Humboldt, they are not much to be relied on†. We are equally ignorant of the native country of most of those vegetable productions which have been raised in our gardens from very early times. Indeed, so great and so various are the changes induced by cultivation on the form and appearance of plants, that it would not be easy, perhaps, to recognize the original type of so many varieties. It is said, for instance, that all the different kinds of Cabbage, Savoy, Broccoli, and Cauliflower, are from a plant which is sometimes found growing

* I here speak only of the species of Wheat cultivated in Great Britain, *Triticum hybernum*, the Common or Winter Wheat, and *Triticum æstivum*, Spring Wheat. Another species, *Triticum monococcum*, is grown in India, and other countries within the Tropics.

† Geographie der Pflanzen, p. 22.

wild on our sea-shores, the *Brassica oleracea*,—that the Clove Pink and the Carnation are varieties of a flower growing among the ruins of some of our old castles, the *Dianthus caryophyllus*,—and that the Polyanthus is a variety of the wild Primrose. It is extremely difficult, I think, to understand in what way cultivation tends to produce these extraordinary changes; but at least equally difficult to resist the evidence of their reality.

The Hon. and Rev. William Herbert raised from the seed of a single plant of the Common Cowslip, highly manured,—a Primrose, a Cowslip, and Oxlips of the usual and other colours; a Black Polyanthus, a Hose-in-hose Cowslip, and a natural Primrose bearing its flower on a Polyanthus stalk*. Why then are not these varieties found in our fields or coppices? If manure is wanting, surely any requisite portion must be often furnished by the spontaneous decay of animal and vegetable matter, in such situations.

Botanists seem to have assumed rather too hastily the existence of a clear and well-marked distinction between those variable differences which arise from cultivation, and those constant and unchangeable differences which separate

* Horticultural Transactions, vol. 4. p. 15.

one species of plants from another. The author of the interesting paper just referred to informs us that he has obtained mules, or intermediate species, between the several kinds of African *Ixias;* that the seeds of these intermediate species have proved fertile, and yielded plants like their parents. Now the specific differences between the Ixias are at least as well marked as in most other genera. How then shall we set limits to the number of new species which may originate from such accidental crosses? or how shall we determine to what extent the character of our cultivated grain, or of our common fruits, may have been changed by centuries of artificial management?

In support of this view of the subject, I am glad to avail myself of the authority of Wahlenberg. "It is not easy," says he, "to decide, "in every case, whether the specific differences "of plants are invariable or not; and I do not "blush to avow, that my observations, in re- "gions widely varying as to soil and climate, "have led me to form an opinion differing essen- "tially from that of the greater number of "botanists. A naturalist who has visited only "level countries, such as northern Germany, "can scarcely imagine how variable are the "appearances of plants in mountainous dis-

"tricts. He frames for himself certain specific "characters, and by their help supposes that "he can determine between different species "in any part of the world; and, in order com- "pletely to satisfy himself on the subject, raises "a few specimens in his garden. But I do not "hesitate to affirm, that conclusions so drawn "are not to be put in competition with the ex- "traordinary transitions observable in many of "the plants of Lapland. Who has ever been "able to bring back to their original form the "monstrous productions of our gardens: for "instance, the Double Peony? When, there- "fore, I assert that the *Woolly-leaved Willow** "is sometimes found with leaves perfectly entire, "sometimes serrated; sometimes round, some- "times spear-shaped; sometimes downy, some- "times perfectly smooth; I merely state the "result of my own unquestionable experience, "which I cannot consent to overlook for the "sake of pleasing the fancies of botanists†."

The cultivated apple is thought to be a variety of the Crab, and may therefore be considered a native of England. This fruit does not ripen north of Sundswall, in Sweden, in latitude 62°‡, nor in the east of Europe, beyond

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* Salix lanata. † Flora Lapponica, viii.

‡ Wahlenberg: Flora Lapponica, li.

latitude 57°*. Its near relations, the *Pear* and the *Quince*, are not natives of England, but are found wild in the southern parts of Europe. The Quince scarcely succeeds in the northern counties of England: it has not been known to ripen its fruit beyond the Tees more than twice in twenty years, though it flowers freely. The *Medlar*, the *Walnut*, and the *Chesnut*, succeed no better; and even the *Filbert* bears very sparingly. The *Vine* seldom flowers; and if, by chance, small grapes are produced, they soon drop off. The *Mulberry* is there a low, stunted tree; but in hot summers bears abundance of small fruit, which in part comes to maturity, and is well-flavoured†.

We are thus able to assign the northern limit to the cultivation of most of our common fruits. But if we pursue the same inquiry on the western side of the kingdom, following the line of the coast from Cumberland to Cornwall, we shall arrive at some very extraordinary and unexpected results; results which serve remarkably to illustrate the peculiarities of an *Island Climate*. At the further extremity of that long

* Decandolle and Sprengel, p. 275.

† Winch, on the Geographical Distribution of Plants in the Northern Counties.

promontory, which, projecting into the Atlantic, forms at once the most southern and the most western point of England, neither the *Apricot*, the *Vine*, nor the *Greengage Plum*, produce ripe fruit, for want, as it should appear, of sufficiently powerful sunbeams. Yet such is the mildness of the winter, that the *Myrtle*, the *Camellia*, and other greenhouse plants, grow luxuriantly in the open air; and the ponds are seldom sufficiently frozen to bear the weight of a man*.

An analogous observation was made by Arthur Young, nearly forty years ago, with regard to the climate of France. Having, in the course of several tours through that kingdom, minutely observed the agricultural productions of its different provinces, he found that the lines which form the northern boundary of the cultivation of the *Vine*, *Maize*, and *Olive*, follow an oblique direction from south-west to north-east†; an observation which appears, at first sight, strangely at variance with the known mildness of maritime climates. But the apparent contradiction disappears, when it is considered that the ripening of fruit, and of grain, depends altogether on the force of the sun's

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* Forbes, on the Climate of Penzance.

† Young's Travels in France. See the map of Europe.

rays in summer, and is not affected by the severity of the winter. Now, as I before observed with regard to Lapland and Norway, the interior of the continent of Europe enjoys a hotter summer than the coast, though it has to endure a colder winter. For the purpose of better illustrating this subject, I have drawn, on the map of Europe, a line through four places which are known to enjoy nearly the same mean annual temperature of 50°; marking above and below the line, at each of those places, its mean summer and winter temperature. At Dublin, the difference between the summer and winter temperature amounts to 20°; at London, to 24°; at Manheim, in Germany, to 34°; at Vienna, to 37°. Comparing the two extremes, we find that the summer temperature at Vienna is 69°; of Dublin, only 59°: every kind of fruit and grain, therefore, ripens much more perfectly in the continental than in the insular situation. On the other hand, the winter temperature of Vienna is 32°; that of Dublin 39°; consequently, many tender shrubs flourish in Ireland which will not grow at Vienna, though no less than five degrees, or about three hundred and fifty miles, nearer to the equator*.

* These temperatures are from Humboldt's *Lignes Isothermes*. I have confined myself to round numbers, as

It would be wrong, however, to suppose that the line drawn by Arthur Young, as limiting the cultivation of the Vine in France, extends throughout the continent of Europe in the same direction. In that case, it would reach to Moscow, in latitude 56°; whereas vineyards are unknown in Russia to the north of latitude 50°*; which is precisely the extreme limit of the cultivation of the Vine in France. According to Malte-Brun, a line of separation between the countries in which wine forms the

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being less perplexing to the memory, and sufficient for illustrating the nature of the question. The exact temperatures of the four places mentioned are as follows:

	Latitude.	Summer Temperature. deg.	Winter Temperature. deg.	Mean of the Year. deg.
Dublin	53° 21′	59,54	39,2	49,1
London	51 30	63,14	39,56	50,36
Manheim	49 29	67,1	33,8	50,18
Vienna	48 12	69,26	32,72	50,54

It will be seen, that the mean temperature of Dublin is less by about 1° than that of the other places. If we had an accurate statement of the temperature at Limerick, in latitude 52° 35′, it would, in all probability, correspond very nearly with the rest; one degree of latitude, in our climate, answering pretty exactly to one degree of temperature. I have, therefore, in the map, drawn the line through Limerick instead of Dublin, estimating its summer temperature equal to that of the latter city, and its winter temperature two degrees higher.

* Tooke's View of the Russian Empire, vol. iii. p. 345.

principal drink of the people, and those in which they principally consume beer, may be drawn from the south of England through French Flanders, Hesse, Bohemia, the Carpathian Mountains, Odessa, and the Crimea *. This line, it will be observed, is not exactly the same as that which limits the cultivation of the Vine. Something must be allowed for national custom. The people of the north-western part of France drink wine, though not produced on the spot, but brought, at a considerable expense, from the more southern provinces, because, to a Frenchman, habit has rendered wine one of the necessaries of life. The Russians, on the other hand, accustomed to beer, do not drink much wine, even in those southern districts where the climate admits of the cultivation of the Grape.

Humboldt estimates that the cultivation of the Vine succeeds only in those climates where the annual mean temperature is between 50° and 63°; or the mean temperature may even be as low as 48°, provided the summer heat rises to 68° †. In the Old World, these conditions are found to exist as far north as latitude 50°; in the New World, not beyond latitude

* Précis de la Géographie Universelle, tom. vi. p. 61. See the map of Europe.

† Prolegomēna, p. 159.

40°. In both hemispheres the profitable culture of this plant ceases within 30° of the equator, unless in elevated situations, or in islands, as Teneriffe, where the intensity of the heat is moderated by the atmosphere of the sea. Thus the region of vineyards occupies a band of about 20° in breadth in the Old World, and not more than half that breadth in America. It may be observed, that the wines produced in the northern part of this region, as those of France and of the Rhone, are lighter and more acid than such as are produced nearer the tropic; owing, probably, to the inferior force of the rays under which the fruit is ripened. In the southern hemisphere, the Cape of Good Hope just falls within the latitude adapted to the Grape; and a considerable quantity of wine is annually exported from that settlement. It is of very inferior quality to the wines of Europe and northern Africa, having an unpleasant, earthy taste, which is said to arise from the clayey nature of the soil.

In the north of Italy, west of Milan, we first meet with the cultivation of Rice. This is the seed of a species of grass, bearded like Barley, which, having somewhat of a stiff and reedy foliage, yields a whispering sound when agitated by the wind. It delights in moisture; and, from the time when the blade rises a few

inches above the surface; the fields in which it grows are flooded to the depth of several inches by means of artificial water-courses, provided with sluices. The water is not drawn off till the grain is nearly ripe*. Three years in succession does the soil yield a crop of Rice without manure: it is then suffered to remain two years uncovered with water, during which time it receives one coat of dung, and becomes spontaneously covered with an abundant, though coarse herbage. Since an acre of Rice is worth, on an average, two acres of Wheat, it may be supposed how large a profit attends the cultivation of this grain; but so deleterious is the employment to the health of the labourers engaged in it, that the government has prohibited its further extension. Rice can evidently be raised only in situations where the land may at pleasure be covered with water. This is an advantage enjoyed by the whole plain of Lombardy,

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* The poet of Chichester has given a curious proof, in his *Oriental Eclogues*, that he had never visited the scenery which he describes:

> "What time 'tis sweet *o'er fields of rice to stray*,
> Or scent the breathing maize at setting day."

There is probably a reference to the sowing of Rice in that text of Ecclesiastes: "Cast thy bread upon the waters, for thou shalt find it after many days."

naturally of great fertility, and rendered still more productive by a system of irrigation more complete, I might almost say more *magnificent*, than is to be found in any other part of the world. Enclosed between two noble chains of mountains, the Alps to the north and west, the Apennines to the south, the deep and rich soil of this plain seems to have been deposited by an inundation which brought down a portion of the substance of those mountains;—consisting, near their bases, of large rounded stones, which gradually diminish in magnitude towards the shores of the Gulf of Venice, where the soil consists entirely of finely-divided matter*. To the east of Milan this plain is covered with pastures of extraordinary richness, from which is brought the celebrated *Parmesan cheese*. These pastures are regularly flooded. The grass is cut no less than four times in the year: part is made into hay, and part carried green to the cows, which are kept in stalls. In about fifteen years, the herbage, in consequence of this continual watering, becomes too coarse for use: the land is then ploughed up, and during five years cropped with Wheat, Oats, Maize, Hemp, and Beans, after which it is again laid down to grass.

* Saussure: Voyages dans les Alpes.

This admirable system of irrigation, which has rendered northern Italy the most fruitful country, perhaps, in the world, was established in very early times: it was during the flourishing period of the Lombard republics, about the era of our Norman and early Plantagenet kings, while the greater part of Europe remained yet in a state little short of barbarism, that the design was conceived and executed of this great national work. From each of the lakes that occupy the lower declivities of the Alps, and receive the waters of their innumerable springs, issues one principal canal, which, as it descends, is subdivided into a multitude of smaller channels, visiting every district, every farm, and even every individual field, to each of which the water is admitted at pleasure by sluices; and having performed its office, passes off by another cut to the lower land, till it ultimately reaches the Po, which carries off the whole drainage of central Lombardy into the Gulf of Venice. The banks of these canals are mostly planted with Willows and Alders, over which are frequently seen rows of tall Poplars. The principal canals belong to the government: the smaller ones are generally the property of individuals, who let or sell the use of the water at so much per hour *.

* Chateauvieux: Lettres d'Italie, let. 20. Young's Travels in France, vol. ii. p. 165—184.

The cultivation of the *Olive* is bounded to the north by a chain of mountains, extending, with few interruptions, from the Atlantic Ocean to the Black Sea. This tree is found in every part of Spain and Portugal; (with the exception of those districts too much elevated above the level of the sea;) it extends over that part of France south of the mountains of the Cevennes; over Italy, south of the Apennines; and Turkey, south of the Hæmus. A traveller from the north, crossing this chain of mountains for the first time, is surprised and delighted at the new aspect of vegetation. Gigantic plants of the Grass tribe* are seen rising to the height of twenty feet and upwards; the air is perfumed with the blossoms of the *Orange* and *Lemon-tree;* the *Myrtle* and *Pomegranate* grow wild among the rocks, with the various species of *Cistus*, that beautiful tribe of plants, which afford such a wonderful succession of flowers, opening every morning, and falling off before the close of the day. The *American Aloe* here blooms in the open air; the *Chamærops humilis* affords the first specimen of the magnificent tropical family of *Palms;* and a few plants may be seen of the *Date Palm* of Africa, cultivated only indeed for ornament, since this tree does

* Arundo donax.

not produce fruit on the northern side of the Mediterranean. It may perhaps be asserted, without exaggeration, that the appearance of vegetation exhibits a less striking change in travelling northwards from Piedmont to Lapland, than in crossing the Maritime Alps from Piedmont to the Gulf of Genoa. On the southern side of those mountains, the vivid green of our meadows and forests is replaced by the dusky tint of the Olive and the Evergreen Oak, which might, perhaps, be termed sombre, if not contrasted with the intensely dark indigo colour of a deep and tranquil sea, undisturbed by tides, and resting on a rocky bottom;—on the other side with the snow-crowned summits of the mountains, strongly relieved against the azure sky; the whole illuminated by the splendour of an Italian sun. Nor is the Olive itself by any means destitute of beauty. It has been compared to a Willow: it differs, however, very materially in its colour, having none of that sickly hue of blueish green which gives such a peculiar coldness to the landscapes of some of the Dutch painters. The upper side of the leaf has precisely that tint familiarly known by the name of *olive:* the under side is of shining whiteness; and as the foliage is turned up by the lightest breeze, its progress over the valleys covered with Olive gardens, becomes visible in the form

of a silver cloud gliding across the landscape.

According to Humboldt, the Olive is cultivated with success in every part of the Old World, where the mean temperature of the year is between 58° and 66°; the temperature of the coldest month not being under 42°, nor that of the summer below 71°—73°. These conditions are found, as I have said, in Spain, Portugal, the South of France, Italy, and Turkey. The Olive also flourishes on the northern coast of Africa, but is not found south of the Great Desert. In Europe it extends as far north as latitude 44½°; in America, scarcely to latitude 34°, so much greater is the severity of the winter on the other side of the Atlantic. In the neighbourhood of Quito, situated under the equator, at a height of eight thousand feet above the level of the sea, where (for reasons which I shall hereafter explain) the temperature varies even less than in the island climates of the temperate zone, the Olive attains to the magnitude of the Oak, yet never produces fruit*.

The inhabitants of the south of Europe employ the oil expressed from the fruit of this tree for the same purposes as we employ butter,

* Prolegomena: p. 154—158.

and feel at least as much dislike to the produce of the dairy, as an article of food, as we may feel to the use of oil. In this country it is scarcely eaten except with salads, for which purpose it is imported in flasks of very thin glass, covered with basket-work. The fruit of the Olive is sometimes gathered in a green state and salted. We are told by Malte-Brun, that if a line be drawn from the Pyrenees, through the Cevennes, the Alps, and the Hæmus, it will separate those countries in which the inhabitants principally make use of butter, from those in which they make use of oil*.

The *Orange* and *Lemon-tree* are rather more tender than the Olive: according to Humboldt†, they require a mean annual temperature of 62°. Orange gardens abound at Nice and Genoa, on the borders of the sea, and sheltered by the high range of the Alps to the north; yet they are not to be seen at Florence, or even at Rome, nor do we meet with them again, in travelling through Italy towards the south, till we arrive at Naples. Accordingly, it appears from registers of the daily temperature during the years 1815, 1816, and 1817, that the temperature of the month of December at Nice

* Précis de la Géographie Universelle, tom. vi. p. 61.

† Prolegomena, p. 158.

exceeds that of Rome by 2°, the temperature of January by 3°, that of February by 4° *.

The *Spanish Chestnut* abounds in the forests of the south of Europe, and sometimes attains to a great size. On the sides of Mount Etna are some of prodigious magnitude: one of them is named the *Chestnut of a Hundred Horse,* intimating that it is capable of sheltering a hundred horsemen under its boughs. It is one hundred and ninety-six feet in circumference. The interior is entirely decayed; and a hut is built within the trunk for the habitation of those who are engaged in gathering and preserving the fruit. Another tree found in the southern parts of Europe is the *Cork-tree* †, a species of Oak whose tough and elastic bark we use for stopping bottles. In the same district are found growing wild among the rocks many of the productions of our gardens: *Thyme, Lavender,* and *Rosemary;* the *Cypress,* the *Laurustinus,* the *Arbutus,* the *Bay,* and the *Judas-tree* ‡. The *Laurel* appears to be a native of Turkey. The *Cabbage Rose* §, and the *Damask Rose* ‖, which appear to have been

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* Clarke, on the Climate and Diseases of France and Italy.—Forbes, on the Climate of Penzance.

† Quercus Suber.

‡ Cercis Siliquastrum.

§ Rosa gallica.

‖ Rosa damascena.

cultivated in our gardens in very early times, were originally brought from the south of Europe. The *Evergreen Roses*[a], introduced within the last twenty or thirty years, are, as their common name imports, from China. Not one species of Rose is found in South America. According to Arthur Young, the culture of the *Fig* and the *Pomegranate* is limited nearly to the same line as that of the Olive[b]. The culture of the *Mulberry*, for feeding silkworms, is not marked by quite so well-defined a boundary, and appears to extend rather further north.

From the declivities of that long chain of mountains which I have described as traversing Europe from west to east, we have received some other of our garden flowers. The *Auricula*, the deep blue *Gentian*[c], and several species of *Saxifrage*[d], delight in the elevated regions approaching towards the limits of perpetual snow. From the lower parts of the mountains come the *Peony*[e], the *Fraxinella*[f],

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[a] Rosa semperflorens. R. Indica, &c.

[b] Travels in France, part ii. c. 3.

[c] Gentiana acaulis. G. verna.

[d] Saxifrage cespitosa; S. oppositifolia; S. Groenlandica; S. androsacea.

[e] Pæonia officinalis.

[f] Dictamnus albus.

the *Black Hellebore*[a], (sometimes called the *Christmas Rose,*) the *Yellow Aconite*[b], and the *Laburnum*[c]. The common *Blue Monkshood*[d], and the *Yellow Monkshood*[e], are also found in this district; but, unlike the plants before mentioned, they extend as far north as Sweden, and the latter even to Lapland. The *Althœa Frutex*[f] is a native of Carniola, on the southern side of the mountains. The beautiful *Pyramidal Bell-flower*[g], bearing a profusion of pale blue flowers, which is often cultivated in pots, and trained in a fan-shape as an ornament to halls and parlours, is from the southern side of the same chain. It is in mountainous regions that the botanist, as well as the geologist, finds the most abundant harvest: indeed even the unscientific traveller is struck with the novelty and beauty of the flowers which he finds at every step on crossing the Alps or the Pyrenees. A variety of surface and exposure is favourable to a variety of productions. Some plants prefer the crevices of naked rocks, others the edges of springs, or the banks of clear and rapid streams, others stagnant morasses. All

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[a] Helleborus niger. [b] Helleborus hyemalis.
[c] Cytisus Laburnum. [d] Aconitum napellus.
[e] Aconitum lycoctonum. [f] Hibiscus syriacus.
[g] Campanula pyramidalis.

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these circumstances are found abundantly in mountainous districts. The great prevalence of bogs in such situations, and the vast abundance of water which flows hourly from the sides of mountains, even in the driest seasons, are very remarkable phenomena, which do not yet appear to have received a satisfactory explanation. From these mountain bogs we have obtained a tribe of plants of extraordinary beauty, which, when planted in the same kind of peaty soil as they find in their native spots, are made to flourish tolerably in our gardens. These are the *Azaleas, Rhododendrons, Andromedas,* and others of the same family.

If from the south of Russia we travel eastward into Asia, the appearance of the country will be found to undergo a very remarkable change. Approaching the northern shore of the Black Sea, the soil becomes sandy, intermixed in places with sea-shells, impregnated with salt, and abounding in lakes of salt water. Such is the aspect of the celebrated *Steppes* of Russia. From the low tract lying between the Black Sea and the north of the Caspian, these sterile regions extend over a considerable part of central Asia. It has been conjectured that these steppes were once covered by the sea, and the limits of the ancient coast have even

been assigned*; but the observation can by no means be extended to the salt deserts in the north of Persia and in Independent Tartary.

The presence of salt, in any considerable quantity, is fatal to corn and most other vegetables: there are, however, certain plants to which it appears indispensable, and which have been, for that reason, called *saline* plants. The Sugar-cane and the Cocoa-nut-tree are almost the only plants which flourish equally well when wetted with fresh water or with brine. From the ashes of these saline plants *soda* is obtained, a substance largely consumed in the manufacture of glass and of soap. It only, however, bears the name of soda when in a pure state, as prepared for medicinal purposes: the coarse salt procured by burning sea-weed, (which is practised to a great extent in the western islands of Scotland,) is called *kelp*. Another kind, prepared from a little plant called *Salsola Kali*, which grows on the sea-shore in most parts of Europe, but is chiefly cultivated for this purpose at Alicant, on the coast of Spain, is called *barilla*. The only difference between these two substances consists in the greater or less admixture of foreign ingredients.

Immediately south of that salt plain which I

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* See the map of Europe.

have described as occupying the space between the Black Sea and the north of the Caspian, is the chain of Mount Caucasus, a most interesting region, both on account of its natural beauties, and of its connexion with the earliest authentic records of history. In the fruitful valleys of Curdistan, a Turkish province on the southern side of these mountains, amidst mountains crowned with perpetual snow; and on the banks of the river Gihon, (better known by its ancient name of Oxus,) which falls into the Sea of Aral, on the east of the Caspian, are found whole thickets of Lemon, Pomegranate, Pear, and Cherry-trees. Every species of fruit cultivated in our gardens grows there apparently wild; but whether they are to be considered as truly natives of the soil, or as being the remains of very ancient gardens, is the more difficult to determine, as this is just the spot which appears to have been first peopled by the descendants of Noah. Admitting it to be doubtful whether the mountain which now bears the name of *Ararat*, on the confines of the Persian and Turkish dominions, is the very mountain on which the ark rested, and whether the vast ruins still to be seen on the banks of the Euphrates are the ruins of the very Tower of

* Humboldt: Geographie der Pflanzen, p. 18.

Babel, erected "in the plain of Shinar," the concurring testimony of a multitude of passages scattered through both sacred and profane history leaves no room to doubt that from this region, as from a centre, arts and civilization were carried to the other regions of the earth; and among the rest, probably, the art of horticulture; for, though we are unacquainted with the original birth-place of most of our cultivated plants, history informs us that some of the most valuable productions of our gardens were first brought into Europe from that fruitful region between the Euphrates and the Indus, the Caspian Sea and the Persian Gulf. The *Walnut* and the *Peach* we derive from Persia; the *Vine* and the *Apricot* from Armenia; the *Sweet Cherry* and the *Spanish Chesnut* from Lesser Asia; from Syria the *Fig*, the *Olive*, and the *Mulberry*. In the triumph of the Roman general Lucullus, after his return from the conquest of Pontus, about a hundred years before the Christian era, was exhibited a Cherry-tree, loaded with fruit, a sight till then unknown to the inhabitants of Italy*. From the same regions we derive the *Hyacinth*, the *Tulip*, the *Iris*, the *Ranunculus*, and some other of our garden flowers, most of which appear to have

* Humboldt: Geographie der Pflanzen, p. 18, 19.

been first brought into this country during the reign of Elizabeth. To this list may be added the *Horse Chesnut*, the *Lilac*, the *Sweet Jasmine*, the *Melon*, and the *Cucumber*. That the Melon and Cucumber were raised in Egypt at a very remote period, appears from the complaints of the Israelites, when they murmured against Moses and Aaron in the wilderness. "We remember the fish," said they, "which we did eat in Egypt freely; the *Cucumbers*, and the *Melons*, and the *Leeks*, and the *Onions*, and the *Garlick* *." And in another place they speak of some kinds of fruit now cultivated: "Wherefore have ye made us to come up out of Egypt, to bring us in unto this evil place? It is no place of *seed*, or of *Figs*, or of *Vines*, or of *Pomegranates*, neither is there any water to drink †."

The "wilderness" in which these complaints were uttered by the children of Israel, forms a part of that great sandy desert which bounds to the west the fruitful plain of the Euphrates, extending thence southward over a considerable part of Arabia. In this desert are still to be seen the ruins of Palmyra, supposed to be the city built by Solomon, and named by him *Tadmor in the Wilderness*. Between the desert and the Mediterranean Sea is the "*Land of*

* Numbers, xi. 5. † Ibid. xx. 5.

Promise," bounded on the north by Mount Lebanon, still famed for its majestic *Cedars.* The *Cedar of Lebanon**, though now cultivated as an ornamental tree in many parts of the world, has not been found wild except in the mountain from which it derives its name. Again crossing the desert to the extremity of the Red Sea, we find a narrow tract of cultivated country along its eastern shore, extending to *Yemen,* the *Happy,* or *Fertile Arabia,* the country of *balm, frankincense,* and *myrrh.* From Arabia the Balm-tree was first carried to Judæa, as Josephus assures us, by the queen of Sheba, as a present to Solomon; where, being afterwards cultivated for the sake of its fragrant and medicinal juice, particularly on Mount Gilead, it acquired the name of *Balm of Gilead.* Frankincense and myrrh also consist of the dried juices of trees: the same may be said of *Gum Arabic,* which is procured from a species of *Mimosa,* growing on both sides of the Red Sea, as well as in Senegal, and other parts of Africa. The Mimosa family is a very numerous one, all of them natives either of the tropical countries, or of the warmer part of the temperate zone. Some of them have the remarkable property of folding up and drooping their

* Pinus Cedrus.

leaves at the approach of night, or when touched by any external object, whence they have attained the name of *Sensitive Plants.* All of them bear pods, like the Pea family; but their blossoms are rather like those of the Willow, consisting of little globes of yellow threads*. Their leaves (when they produce leaves) are always finely divided; often as much so as those of the Carrot, a circumstance which gives to these trees a very peculiar aspect; but a considerable proportion of the Mimosas are, properly speaking, leafless, excepting when very young, or after having been injured. The leaf-stalk, however, remains, and assumes a flatted shape, having somewhat of a leaf-life appearance, but differing from a true leaf in its edge being turned towards the stem: its two sides are consequently similar, and perform the same functions with respect to the light. This

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* It is to this form of the blossom, I apprehend, that the author of Lalla Rookh alludes:

> "Our rocks are rough; but smiling there
> Th' *Acacia* waves her *yellow hair*,
> Lonely and sweet, nor lov'd the less
> For flow'ring in a wilderness."

The name of *Acacia* is at present given to those species of Mimosa which are not sensitive.

is particularly the case with the Mimosas of New Holland *.

Returning to the neighbourhood of the Red Sea, we find, on its eastern shore, the native country of the *Coffee-tree*, which is an evergreen, fifteen or twenty feet high, bearing in the bosom of the leaves several white, sweet-scented flowers, of the size of snowdrops. The flower is succeeded by a berry, containing two seeds: these seeds are *coffee*. The use of this commodity was introduced into England in the year 1652, by Daniel Edwards, a Turkish merchant. He brought home with him from the East a Greek servant, who opened a coffee-house in George Yard, Lombard-street. The cultivation of the Coffee-tree was introduced into the West Indies about the beginning of the last century; and from these islands we now obtain our principal supply; but "*Turkey Coffee*" is still held in most esteem. In the neighbourhood of the Red Sea is found also that species of *Cassia* whose dried leaves are employed in medicine, under the name of senna, and the plant yielding *bitter aloes*, which must not be confounded with the American Aloe cultivated in our greenhouses. Bitter aloes

* Brown: Appendix to Flinder's Voyage to Terra Australis, vol. ii. p. 587.

are brought chiefly from the island of Socotra, in the Arabian Sea, near the Straits of Babelmandel.

In the narrow, but fruitful valley of the Nile, we find several new vegetable productions. Among the most remarkable of these is the *Papyrus*, a species of reed which was employed by the Egyptians in early times for making paper. For this purpose, the inner rind of the stem being cut into strips, and laid together somewhat like matting, was pressed with a weight till the whole adhered together. The Papyrus is several feet in height, and bears a sort of tuft or feathery head at the top of the stalk: it grows chiefly in marshy places. In Egypt also grows a species of Water Lily, called the *Lotus* *, of which both the root and the seeds are eatable; and from Egypt was introduced into our gardens the *Mignonette*. This country was once regarded as the granary of Europe, and is still remarkable for its fertility; producing large crops of *Rice*, *Wheat*, *Barley*, and some other species of grain unknown among us; while *Oats* are equally unknown in Egypt; the horses, as in all parts of the East, being fed upon Barley. Egypt, like the plain of Lombardy, owes much of its fertility to a system of

* Nymphæa Lotus.

artificial irrigation, established in times of its ancient prosperity. From the want, however, either of sufficient skill, or of a sufficient fall in the surface, the water does not flow spontaneously over the fields, but is raised, at a great expense of labour, by means of wheels worked by oxen. The present pacha, or sovereign of Egypt, is said to be a man of genius, and to give much attention to improving the natural resources of the country. Through his exertions, the cultivation of *Cotton* has been so much extended, that no less than a hundred thousand bags of that commodity were exported from Egypt to Great Britain in the year 1825.

It will scarcely be necessary to say any thing more of the plants peculiar to Africa, except to mention that its southern extremity (the Cape of Good Hope) has supplied us with a considerable proportion of the most splendid flowers which ornament our greenhouses; particularly the *Heaths*, the *Geraniums*, and the bulbous-rooted plants, comprising the two families of *Ixia* and *Gladiolus*.

Before passing to the New World, it will be proper to take a cursory survey of the remaining productions of Asia. The *Weeping Willow* grows wild in all parts of the temperate zone of this continent, from Persia to Japan. The plant whose root affords the medicinal *Rhu-*

*barb**, is from the confines of Russian and Chinese Tartary. The *Crown Imperial* is from Persia. In the same country grows an umbelliferous plant†, from whose root the stinking gum called *assafœtida* is procured. From India we have received the *Balsam* and the *Kidney Bean.* There also grows the *Teak-tree*‡, or Indian Oak, which has been much employed of late years in ship-building. It so far excels the European Oak in durability, that Indian-built ships, constructed of the wood of this tree, often last forty years or more in those seas, where our ships are ruined in five years. Instead of corroding the iron bolts, the Teak wood is said to possess an oily quality, which serves rather to preserve them. In India is also found the *Banyan-tree*§, whose branches have the remarkable property of drooping to the earth, and there taking root; so that a single tree forms a curiously-arched grove. From China we appear to have originally received the *Orange-tree,* which is now cultivated abundantly in Italy, Spain, Portugal, and other parts of the south of Europe. From the same country the *Hydrangea* was introduced by Sir Joseph Banks, in 1790. It has been cultivated by the

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* Rheum palmatum.
† Ferula assafœtida.
‡ Tectona grandis.
§ Ficus Indica.

Chinese in their gardens from time immemorial; but of what place it is a native seems doubtful. The various species of *China Rose* are of still more recent introduction into this country. The *Chinese Chrysanthemum*, which produces its variously coloured and beautiful blossoms after almost all our other flowers are past, was introduced in 1795. From China we are also said to derive the *Radish* and *Endive*.

The *Tea-tree* is cultivated almost exclusively in China and Japan; and from the first of these countries our whole supply (amounting yearly to about three hundred and fifty thousand chests) is derived. It appears probable, however, that this plant might be raised in other parts of the world, if allowed to supply the English market: at present, the permission to import tea is restricted to the East India Company. Though now in such general use among all ranks as to be considered almost a necessary of life, little more than a hundred and fifty years have elapsed since tea was first introduced into England. The tree whose dried leaves form so considerable an article of commerce, is described as an evergreen of moderate height, producing white flowers like those of the Myrtle.

Before we travel further southward, to survey the vegetable productions of the torrid zone, it will be proper to cross the Atlantic, and take a review of the plants belonging to North America; for so great is the resemblance between the tropical productions of the two hemispheres, and so little analogy have they with the productions of other parts of the globe, that it is better to contemplate them as a whole, rather than separately to speak of those which grow in the Old and in the New World. Returning therefore towards the polar regions, we shall find, on comparison, some interesting points of resemblance between the climate and vegetation of the corresponding shores of the two continents; the western coast of America exhibiting appearances similar to those of Norway and other countries on the western shore of Europe; while the vegetation of Newfoundland, on the eastern coast of America, is like that of Kamchatka, on the eastern coast of the Old Continent, in the same latitude*. In Greenland, of which the southern extremity lies in latitude 59° 38′, (ten or eleven degrees nearer to the equator than the point at which trees cease to grow in Norway and Lapland,) are found only a few *Birches* and *Wil-*

* Wahlenberg: Flora Lapponica, xiv.

lows, of which the utmost height is eighteen or twenty feet. At Nain, on the coast of Labrador, in latitude 57°, only one degree nearer to the pole than Edinburgh or Glasgow, the mean temperature of the year is 5° below the freezing point; lower, therefore, by 5°, than the mean temperature of Cape North, the extremity of Europe, in latitude 71°*. In Canada, which lies under the same parallels of latitude with France, the rigour of the winters is destructive to every species of tree excepting those belonging to northern climates; yet the heat of the summers suffices to bring to perfection many of the southern annuals, and such low plants as are protected in winter by the covering of snow. In this country grows the *Weymouth Pine*, not unfrequently planted in our shrubberies. It is a very beautiful tree when healthy and vigorous; and as it grows remarkably tall and straight, affords the best masts for large ships. Another native of Canada is the Sugar Maple, from whose sap a considerable quantity of sugar is annually prepared by the inhabitants.

The vegetable productions of the temperate regions of North America are distinguished by their variety and splendour, compared with those produced in the same latitudes of the

* Humboldt: Lignes Isothermes.

AMERICA.
Equinoctial Line
Tropic of Capricorn
Southern Limit of Terra Firma
Buenos Ayres
Rio Janeiro
Cape Horn
Falkland Islands
Terra del Fuego
Magellan's Straits
Cape Blanco
Cape Corrientes
Cape St. Augustine
Cape Gracias a Dios
Cape Florida
Cape Breton
Cape Farewell
Cape Chidley
Cape Charles
Cape Henry
Cape Hatteras
Cape Fear
Cape Look out
Cape Romain
Cape Canaveral
Cape Sable
Cape Catoche
Cape Corrientes
Cape Antonio
Cape St. Lucas
Cape Mendocino
Cape Blanco
Cape Gregory
Cape Prince of Wales
Cape Barrow
Cape Bathurst
Cape Dalhousie
Cape Perry
Cape Krusenstern
Cape Lisburne
Cape Rodney
Cape Mulgrave
Cape Fairweather
Cape Hinchinbrook
Cape Elizabeth
Cape Douglas
Cape Newenham
Cape Romanzoff
Cape Prince of Wales
Cape North
Cape Farewell
Cape Walsingham
Cape Chudleigh
Cape Dudley Digges
Cape Comfort
Cape Wolstenholme
Cape Henrietta Maria
Cape Perry
Cape Krusenstern
Cape Lisburne
Cape Rodney
Cape Mulgrave
Cape Fairweather
Cape Hinchinbrook
Cape Elizabeth
Cape Douglas
Cape Newenham
Cape Romanzoff
Cape Prince of Wales
Cape North
Cape Farewell
Cape Walsingham
Cape Chudleigh
Cape Dudley Digges
Cape Comfort
Cape Wolstenholme
Cape Henrietta Maria
Cape Perry
Cape Krusenstern
Cape Lisburne
Cape Rodney
Cape Mulgrave
Cape Fairweather
Cape Hinchinbrook
Cape Elizabeth
Cape Douglas
Cape Newenham
Cape Romanzoff
Cape Prince of Wales
Cape North
Cape Farewell
Cape Walsingham
Cape Chudleigh
Cape Dudley Digges
Cape Comfort
Cape Wolstenholme
Cape Henrietta Maria

eastern hemisphere *. From the territories of the United States we have received some of the

It blooms only once, the plant dying after it has completed its fructification, as happens with our annuals and biennials; but, instead of coming to maturity in one or two years, it requires a very long period for its growth: according to the vulgar opinion, a hundred years; but this appears to be an exaggeration. When the time for its blooming arrives, a flower-stem rapidly pushes

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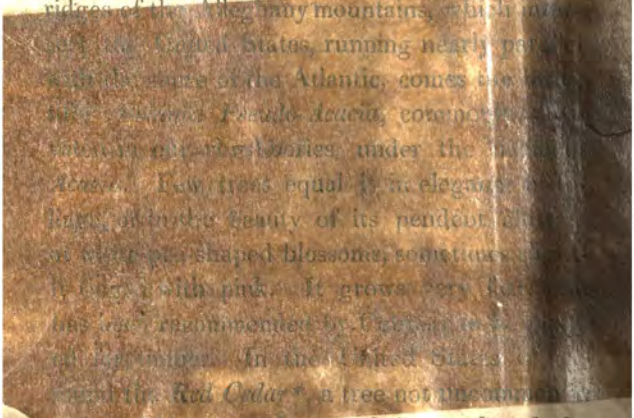
* Humboldt: Geographie der Pflanzen, p. 30. "It seems," says the author, "as if nature had laboured to adorn the Land of Freedom."

+ Prolegomena, p. 44.

‡ Agave Americana.

up from the root to the height of thirty feet or more, bearing a branched spike of many thousand large and splendid flowers. From the



berries. Its wood is employed for black-lead pencils, and for lining the inside of desks; for which last purpose it is recommended both by its pleasant smell and by its property of driving away insects. There also grows the *Tulip-tree*†, the *Arbutus*‡, and one of the two species of *Arbor Vitæ*§ commonly cultivated here: the other species, of a looser growth, which comes from China‖, is often improperly called the *Lignum Vitæ*. The sort of hard

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* Juniperus Virginiana.
† Liriodendron tulipifera.
‡ Arbutus laurifolia.
§ Thuja occidentalis.
‖ Thuja orientalis.

and heavy wood known by this name among cabinet-makers, is the produce of the *Guaiacum*, a tree growing in the West Indies, of totally different appearance.

pole in the interior than upon the coast. Thus, on the coast, the growth of the *Yellow Horse Chestnut** terminates at latitude 36°; behind the mountains, at latitude 42°. The *Black Walnut*† on the coast ceases to grow in latitude 41°; behind the mountains, in latitude 44°‡.

It has been observed that in America the form of the continent, and disposition of the mountains, admit of a greater intermixture of the productions of warm and cold climates than in the Old World; where the Mediterranean, extended from east to west, and the mountains, lying in the same direction, form impassable

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* Æsculus flava. † Juglans nigra.

‡ Humboldt: Geographie der Pflanzen, p. 88.

barriers, which preclude the passage of plants from one latitude to another. Thus the Pines of the North are found on the high lands of Mexico as far as the Isthmus of Panama; and the *Liquid-ambar*, a handsome tree, sometimes cultivated in our shrubberies, whose it is [illegible]

ton. The Tobacco plant, which is thought to be a native of the Andes, is seen not unfrequently in our gardens. The use of tobacco was introduced into England by Sir Walter Raleigh, in the reign of Elizabeth. Our best Rice is from Carolina; but this grain is likewise imported from India, in which country, as well as in China, it forms a great part of the food of the inhabitants. The Rice plant is said by Linnæus to be a native of Ethiopia. Cotton is procured from the pods of several plants, but all of them of one family: it forms the covering of the seeds. Those of the larger species, which

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* Prolegomena, p. 45.

attain to the magnitude of trees, require, according to Humboldt, a mean annual temperature of at least 68°; the shrubby kind is cultivated with

principal supply of this material is from North America: some is brought from the West Indies, some from Surinam and Brazil. Since the opening of the trade with India, a considerable quantity has been imported from Bengal; and during the last four years, a large and increasing supply has been obtained from Egypt.

The tree which furnishes us with *mahogany*‡ is a native of the New World. It grows to a large size, and produces handsome spikes of white flowers, not unlike those of the Lilac. The mahogany of best quality comes from St. Domingo; an inferior sort from Honduras, on

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* Prolegomena, p. 157.

† Tooke's View of the Russian Empire, vol. iii. p. 281.

‡ Swietenia mahagoni.

the western shore of the Caribbean sea. From the same coast we receive two species of dye-wood; *logwood* *, which yields a purple colour; and *fustic* †, a brown. *Brazil wood* ‡, which gives a red colour, is from Florida, on the other

a property said to be possessed more or less by all the plants of this genus. From Mexico comes likewise the splendid *Dahlia*, which was introduced into this country by Lady Holland, in 1804. From Peru we have the *Potatoe*, the *Nasturtium*, the *Scarlet Fuchsia*, and the fragrant *Heliotrope*. The common *Passion-flower* is from Brazil.

The *Cactus* family belongs as exclusively to the New World, as the Heaths to the Old ¶. As specimens of this extensive genus,

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* Hæmatoxylum campechianum.

† Morus tinctoria. ‡ Cæsalpinia brasiliensis.

§ Helianthus annuus. ‖ Helianthus tuberosus.

¶ Humboldt: Personal Narrative, vol. ii. p. 27. English Translation.

I may mention the *Prickly Pear*, or *Indian Fig**, and the *Creeping Cereus*†, which are common in our greenhouses. There is something very marked and extraordinary in the aspect of this tribe. In many of the species

handling them imprudently, and cause inflammation. The flowers are generally beautiful and brilliant; not produced on stalks, but issuing directly from the substance of the plant. A few of the Cacti are found in the United States of North America; but most of them are natives of the West Indies and South America, where they attain to a great size, and contribute to the singular aspect of the vegetation of the tropical regions of the New World.

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* Cactus opuntia. † Cactus flagelliformis.

The last mentioned plants have brought us within the limits of the torrid zone. Let us now

" of picturesque scenery, he can scarcely," says Humboldt, " define the various emotions which " crowd upon his mind; he can scarcely dis- " tinguish what most excites his admiration,— " the deep silence of these solitudes, the indi- " vidual beauty and contrast of forms, or that " vigour and freshness of vegetable life which " characterize the climate of the tropics. It " might be said that the earth, overloaded with " plants, does not allow them space to unfold " themselves." The trunks and branches of the trees are covered, not with mosses and lichens, as in our climate, but with beautiful flowers: among the rest with several species of *Orchis*, a tribe of plants, some of which are probably known to you, as they grow wild in our

own country,—remarkable for the singular resemblance of their flowers to certain species of insects. In the *Bee-Orchis*, particularly, this resemblance is very striking*. "In the torrid "zone," continues Humboldt, "creeping plants "often reach from the ground to the very summits of the trees, and pass from one to another at the height of more than a hundred "feet, so as to deceive the observer, and lead "him to confound the flowers, the fruit, and "the leaves, which belong to different species†." "So thick and uninterrupted are the "forests which cover the plains of South America between the Orinoco and the Amazons,

* It must not, however, be supposed that this resemblance to an insect is found in all the species of Orchis. In the greater number of them, either no such resemblance exists at all, or one extremely fanciful and distant. But as the Bee-Orchis, in consequence of this very striking peculiarity, is likely to excite the attention, and to dwell in the recollection of all who have once seen it, I have mentioned that as a specimen of the tribe. There are, however, several species far more common than the Bee-Orchis: the Orchis mascula and Orchis morio may be found in almost every field and hedgerow in the month of May. Few families of English plants equal this in beauty; and it is pronounced by Humboldt to constitute the greatest ornament of the vegetation of the tropics. The *species* there found are, however, all of them different from those of Europe.

† Personal Narrative, B. iii. c. 6.

"that were it not for intervening rivers, the "monkeys, almost the only inhabitants of these "regions, might pass along the tops of the "trees for several hundred miles together with-"out touching the earth*." This vast wilderness presents none of that wearisome uniformity of aspect which often characterizes the forests and heaths of temperate climates. Not only do we meet in the tropical regions with new *genera* and *species*, but with new *families* of plants, strongly contrasted in their forms and modes of growth with those of other parts of the world: others again acquire, in the torrid zone, the height and bulk of trees, which in Europe never exceed the magnitude of herbs; and some of those which abound in our climates wholly disappear.

In order to give you a clear apprehension of the nature of these changes, it will be necessary to say a few words on the internal structure of the blossoms of plants; for it is by means of differences in this internal structure that the families of the vegetable world are in a great measure distinguished from each other. You have, without doubt, observed those little threads which almost all flowers contain within their blossoms. One or more of these threads, stand-

* Geographie der Pflanzen, p. 4.

ing in the centre of the rest, grows on the seed-vessel, and differs in form from those which surround it. This is called the *pistil,* the others are the *stamens.* These last are crowned with knobs at their extremities, which open as the blossom expands, and let out a sort of powder, generally of a red or yellow colour. The bees diligently collect this powder, load it on their hind legs, and carry it to the hive for the purpose of feeding their young. In thus providing for their own progeny, these insects often assist very materially the process of fructification; for, unless the summit of the pistil be touched with this fertilizing dust, the fruit does not swell, nor the seed arrive at maturity. And as the stamens, in certain plants, grow on different blossoms from the pistils, it is by the help of the bees, chiefly, that the development of the fruit is secured; some of the powder which they have collected from the stamen-bearing flowers being unconsciously left by them in visiting the pistil-bearing flowers. In certain cultivated plants which have these two kinds of blossoms, as the Melon and Cucumber, the process of fructification is insured by the gardener, who plucks the staminiferous flowers, and inverts them upon the other. In the Hautboy Strawberry these two sorts of blossoms are produced by distinct plants; and of course

the stamen-bearing plants yield no fruit; but their presence is necessary to the swelling of the berries produced by the neighbouring roots. For want of acquaintance with this provision of nature, some unskilful gardeners pluck up those stools which they find barren, and therefore consider as useless, whence they obtain scarcely any fruit from the remainder.

It is by the number and position of the stamens and pistils, chiefly, that the several tribes of plants are discriminated. Such distinctions may appear, at first sight, very slight and trivial: it may appear a matter of very little importance, whether a flower has four, five, or fifty stamens; whether they are united at the top, or at the bottom, or not united at all; whether they grow out of the pistil, out of the petals*, or out of the base of the blossom; but observation has shown that these peculiarities, slight as they may appear, are intimately connected with the whole structure and manner of growth of the plants in which they are found, and even with the nutritious or medicinal qualities of those plants.

After these few preliminary explanations, I may proceed to mention, in the first place, two families of plants which are entirely wanting in

* *Petal* is the botanical term for a flower-leaf.

the torrid zone; at least in those parts where the elevation of the soil above the level of the sea does not render the climate as cold as in the temperate zone. These are the *umbelliferous* plants, of which *Parsley* and the *Carrot* may serve as familiar examples; and the *cruciform* plants, comprehending the *Cabbage* and *Turnip*. The umbelliferous plants are so marked by their peculiar mode of growth, that you can hardly fail to recognize them at sight; the flowers being invariably disposed in a round, flattish head, supported by numerous short flower-stalks, radiating from the stem like the wires of an umbrella. They have uniformly five stamens in each blossom, five petals, two pistils; and generally two seeds, unenclosed in a seed-vessel. The cruciform plants have not quite so marked and striking a character. The *cross-shaped* disposition of the four petals (from which the term cruciform is derived) is, indeed, obvious enough; but then many plants belonging to other families have the same cross-shaped blossom. It is the combination of *four petals* with *six stamens* that marks the cruciform tribe; or the plants of this family may be discriminated by the stamens only, two of the six being invariably shorter than the other four. It is an interesting fact, that no one plant of this division is endued with poisonous qualities.

Another family of plants which greatly diminishes in number towards the equator, though it does not entirely disappear, consists of trees bearing *catkins*. Instead of attempting to define this botanical term, it will be sufficient to refer to the Willow, the Hazel, the Birch, the Alder, and the Poplar, as specimens of the tribe. The form of the blossom in these trees will be familiar to the recollection of every one. The *catkin-bearing trees** are proportionally twenty times less numerous in the torrid than in the temperate zones.

Of those families of plants which arrive in the tropical regions at a magnitude unknown in our climate, may be enumerated the *Grasses*, the *Ferns*, and the *Mallows* †. Of the Grass tribe, we find a species in the south of Europe exceeding twenty feet in height, as I have already mentioned. Within the tropics, however, we meet with one which rises to the height of sixty feet: this is the *Bamboo*. Its stalk, like that of other Grasses, is jointed and hollow; and so large, that it is employed by the people of India for constructing vessels to hold liquids, one joint being capable of containing a gallon or more. Sometimes portions of this hollow stalk are made use of as garden-pots, and young

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* Amentaceæ. † Malvaceæ.

plants are sent over in them to this country. The stems of Bamboo are also employed in building, in constructing furniture, and for more purposes than can be easily named. The seed forms an article of food in some parts of India*. This plant is found in South America, but more sparingly than in the Old World.

The *Ferns* are distinguished by producing their fructification on the back of the leaf,—generally in the form of brown spots or stripes,—instead of bearing flowers like other plants. We have in England about forty species, none of which exceed three or four feet in height; whereas, in the torrid zone, they attain to the size of trees. Of all the forms of tropical vegetation, these and the Bamboos, according to Humboldt, most excite the attention and awaken the admiration of the traveller†. In their general aspect the Tree Ferns considerably resemble the Palms. Their stems are generally black, as if burnt by the heat of the sun; their leaves of a bright and delicate green, beautifully crisped at the edge‡. It has been observed of the Ferns, that they principally delight in

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* Buchanan's Journey through Mysore, Canara, and Malabar, vol. ii. p. 341.

† Personal Narrative, vol. iii. p. 39.

‡ Humboldt: Geographie der Pflanzen, p. 26.

island situations: few, comparatively, are found in the interior of large continents, owing, perhaps, to the want of a due portion of moisture. They abound amongst the dripping springs that ooze from the crevices of rocks; and some species of exquisite beauty are found lining the sides and roof of the little caverns which contain the sources of natural fountains. Ferns are very numerous in Jamaica, in New Zealand, in Otaheite, and in St. Helena. In this last island they constitute a large proportion of the whole number of native plants.

Of the *Mallow family* we have in England only five species, all of them small. In the torrid zone the plants of this family are exceedingly numerous and splendid, many of them attaining to the magnitude of our forest-trees.

As a first example of one of the new families of plants found within the tropics, I may mention the *Palms*. You have probably some notion of their general appearance; their tall, slender, undivided stems, crowned at the summit with a majestic tuft of feathery leaves; but you are not perhaps aware of the very remarkable difference in their mode of growth from that of other trees. A Palm-tree does not rise from the ground in the form of a twig, which gradually increases in thickness as well as in height. During the first year of its growth, it

has somewhat of an herbaceous appearance, the leaves springing immediately from the root: as these decay, the base from which they issue assumes the appearance of a shapeless stump, upon whose summit a fresh crown of leaves is formed. The footstalks of the old leaves, in some species of Palms, remain upon the stem, giving it a rough and shaggy appearance; in other species, a mark only is left of the place from which they fell. The trunk is often set with scattered thorns. Universally, the body of the tree increases in height without increasing in bulk. There is no distinct bark; nor are any of those concentric rings observable which are found in other trees when the trunk is cut through, and of which the number serves to mark the duration of their lives. In short, the Palms approach more in their manner of growth and in their essential characters to some of the herbaceous plants (particularly to the Lilies) than to our forest-trees; though in height they generally surpass the latter.

The species of Palms hitherto discovered exceed a hundred and thirty in number. Not only do they excel every other family of plants in beauty and stateliness, but in the luxuriance of their fructification. Amidst the solitudes of the South American forests, in places far remote

from human habitation, Humboldt found the ground covered with the fruit of these trees, in places to the depth of three inches*. More than twelve thousand flowers have been counted in a single sheath of the Date Palm. At the nursery of Messrs. Loddidge, at Hackney, may be seen a very fine collection of this family of plants, in a hot-house forty feet in height, constructed expressly for their reception.

I have already mentioned the *Date Palm* †, of which a few trees are to be seen on the southern side of Europe. Its appropriate place of growth is, however, on the other side of the Mediterranean. According to Humboldt, it flourishes best in a mean temperature of from 70° to 73°. In Africa, Egypt, Syria, and Arabia, it is abundantly found; and its fruit, of the size of a small plum, of a yellow colour, and sweet taste, furnishes the inhabitants with a principal part of their food. In the wide sandy deserts of these countries, a few Palm-trees often mark out from a distance to the thirsty traveller the situation of a solitary well. Another kind of Palm, growing principally in the East Indian islands, yields *sago*, a commodity well known in our shops, and universally employed as an article of food by the people of

* Prolegomena, p. 239.

† Phœnix dactylifera

Amboyna, Ceram, Celebes, and Borneo. Sago is not the fruit of the tree, but is produced withinside the trunk.

The *Wax-Palm** is a native of the Andes. It is so named from its trunk being covered with a kind of varnish, possessing the chemical properties of wax. It rises to the vast height of a hundred and sixty feet, and differs from the other Palms in bearing a much colder climate. They extend, in tropical America, from the level of the sea to an elevation of about three thousand feet, and are not to be seen higher: the Wax-Palm is not capable of supporting the heat of the plain, or of the lower part of the mountains, but is confined to a region between six thousand and nine thousand feet above the level of the sea, where it grows among Oaks and Walnut-trees, at an elevation exceeding that of the Hospice of St. Gothard†.

The Cocoa-nut-tree is also of the Palm tribe. It rises to the height of fifty or sixty feet, with leaves ten or fifteen feet long and three feet in width. It is found plentifully on the islands of the South Sea, and often furnishes an useful beacon to the mariner, by pointing out the situation of the rocks of coral just level with the

* Ceroxylon andicola. †Geographie der Pflanzen, p. 60.

water's edge, which abound in those seas. It has been suggested that many shipwrecks might be prevented at a small expense, by carrying out a few cocoa-nuts, and throwing them on these sunken reefs.' The cocoa-nut is, as you know, employed for food; and the liquid which it contains in its interior, when recently gathered from the tree, furnishes a refreshing drink to the inhabitants of those hot countries. From the sap of the tree they also prepare an intoxicating liquor called *arrack*.

It is not from the Cocoa-nut-tree that *cocoa* is prepared, but from a tree called the *Cacao*, which is not of the Palm tribe. The Cacao is cultivated in many parts of South America. It succeeds best in a moist atmosphere and cloudy sky, under a mean temperature not below 73°*. Its fruit forms an important article of commerce; cocoa and chocolate (which last is a preparation of cocoa) being in general use among the South Americans and Spaniards.

The *Plantains* are another family of plants peculiar to the torrid zone, where they form a principal article of cultivation in both hemispheres. As in our fruit-trees, the number of varieties is very great; and so much is their appearance changed by artificial management

* Humboldt, Prolegomena, p. 156.

that it is difficult to determine with certainty between the several species. The common Plantain, or *Banana* *, grows to the height of twelve feet or more, with a stem a foot in diameter, round, smooth, and juicy; the leaves are a foot in width, and several feet in length, with a strong mid-rib, and numerous cross veins; the younger ones upright, and of a yellower green, the outer ones bending down, and generally torn by the wind: the flower-stalk is several feet long, bearing numerous alternate tufts of splendid blossoms †. The fruit is shaped somewhat like a cucumber, has a sweet, mealy taste, and furnishes an important article of food to the inhabitants of the tropical countries. An acre covered with Plantains furnishes nearly twenty times as much food as the same space sown with corn. In Europe, our Wheat, Barley, Oats, and Rye, cover a large proportion of the surface of the ground in well-populated districts: in equinoctial America, on the contrary, a great number of inhabitants find abundant nourishment on a narrow space, cultivated with

* The imagination of Linnæus seems to have been greatly excited by the aspect of these plants, if we may judge from the magnificent appellations which he bestowed upon them. The Common Plantain is the *Musa paradisaica.*

† Humboldt: Geographie der Pflanzen, p. 25.

Plantains, Cassava, Yams, and Maize. This gives a peculiar aspect of wildness to the scenery of those countries: plants of spontaneous growth exceeding in number those raised by the hand of man, even in the immediate neighbourhood of large cities*. The *Banana*, like the greater number of the Palms, is confined almost exclusively to the torrid zone, nor is it found at a greater altitude than fifteen hundred feet above the level of the sea.

The *Sugar-cane* has rather a wider range. It is cultivated in North America as far as latitude 31°, and in the Old World succeeds in Sicily, under a latitude of 36°. It requires a mean annual temperature not below 68°. Like the Bamboo, it belongs to the family of Grasses; four or five stems rise from each root to the height of ten or twenty feet, according to the richness of the soil. Each of these stems, or canes, has from thirty to forty joints, from which spring leaves of two or three inches in width. The blossom consists of a loose spike, with innumerable feathery branches spreading every way more than a foot, and drooping at the ends. The canes, when gathered, are crushed between iron rollers, and the juice thus squeezed out is converted into sugar by boiling, and

* Humboldt: Personal Narrative, vol. iii. p. 13, 16.

skimming off the impurities which rise to the surface. The same juice, when fermented and distilled, produces rum. The Sugar-cane is said to be a native of China; it certainly belongs, at all events, to the Old World, and was introduced by Europeans into the West Indies, whence we derive our principal supply of sugar. Since the opening of the trade with India, a considerable quantity of sugar has however been brought from that country; and more undoubtedly would be brought, had not parliament laid an extra duty of 10s. per cwt. on East Indian sugar, for the protection of the West India proprietors.

The *Coffee-tree* is very extensively cultivated in the West Indies, where it chiefly occupies the higher grounds, the plains being occupied in the raising of sugar. It demands a mean temperature from 70° to 75°*. Another plant largely cultivated in the tropical regions of both hemispheres, is that which yields *Indigo*†. It is a low shrub, bearing a pea-shaped blosssom. In the preparation of indigo, the whole of the plant is steeped in a cistern of water till fermentation takes place; the liquor is then drawn off into another vessel, where it is continually beat and agitated with a kind of buckets fixed

* Prolegomena, p. 157. † Indigofera tinctoria.

to poles, till the colouring matter is deposited. The cultivation of this plant succeeds best under a mean annual temperature of 77° to 82°. It has however been extended as far as latitude 41° to 43½°, under a mean temperature of 58° to 60°*.

The *Pine-apple* is another production of the torrid zone. Its original place of growth seems a little doubtful. Linnæus ascribes it to New Spain and Surinam; but it appears to grow wild in Africa, and other parts of the Old World. It is the most highly esteemed of all the productions of the fruit-garden. Its culture has been brought to extraordinary perfection in this country; and it is even said that a Pine-apple may be obtained with more certainty every day of the year in London than in Jamaica or Calcutta. The air or climate of France is so unfavourable to this fruit, that the late Duke of Orleans, after repeated trials in different situations, for which he was furnished by Lord Egremont with the plants, the stoves, and even an English gardener, was finally under the necessity of giving up the attempt*. In some of the East Indian islands, Pine-apples are so abundant at certain seasons of the year,

* Prolegomena, p. 156.

† Quarterly Review, vol. xxiv. p. 410.

that the inhabitants are accustomed to clean their swords by running them through the fruit.

The plants which yield *Indian Rubber* are all natives of the tropical regions. The *Hevea*, from which this substance was first procured, is a native of Brazil. It is a tree yielding a milky juice, which is smeared on moulds of clay made in the form of bottles, and then dried in the smoke, whence it attains a blackish colour. After the first layer is dry, another is added, till the requisite thickness is obtained. Thus are the bottles of Indian Rubber prepared. At a later period, it was discovered that the same substance may be obtained from the juice of a climbing plant growing in Sumatra, the *Urceola elastica*. Though similar in its properties, this differs in appearance from the American Indian Rubber, being brought over in square masses, which, when cut, show a yellowish colour within-inside, owing to the juice not being smoked while laid on in the same manner as the other. Some other plants have been discovered which yield the same elastic gum. Like sugar, or the tanning principle, it is common to many vegetable productions widely differing in their nature and appearance.

In the island of Sumatra was discovered, in

the year 1818, a flower of a very extraordinary conformation, which has received the name of *Rafflesia titan.* It does not grow out of the ground, but out of the trunks of trees, like the Mistletoe. It appears first in the form of a round knob or button, which, when cut through, exhibits the infant flower enveloped in numerous sheaths. These successively open and wither away as the bud enlarges. When fully expanded, the flower measures no less than three feet in diameter, consisting of five petals of a brick-red colour, from a quarter to three quarters of an inch in thickness; this monstrous flower having neither leaves, stem, nor root, unless that part be considered as the root by which it is attached to the trunk where it grows *.

In India and the East Indian islands grows the tree which yields the odoriferous *sandal-wood* †; and that heavy, black wood, known by the name of *ebony* ‡. This last is also found in many parts of Africa. The yellow paint called *gamboge* is the dried juice of a tree § found in Ceylon and Cochin China. *Turmeric* is the root of a plant || growing abundantly in Malacca

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* Linnean Transactions, vol. 13, p. 229.

† Santalum album. ‡ Diospyros Ebenum.

§ Stalagmitis cambogioides. || Curcuma longa.

MEDITERRANEAN SEA
NORTH ATLANTIC OCEAN
GREAT SANDY DESERT
Tropic of Cancer
ARABIA
Equator or Equinoctial Line
SOUTH ATLANTIC OCEAN
INDIAN OCEAN
Tropic of Capricorn
AFRICA.

and Java. The sweet-smelling resin called *gum benzoin* is the produce of a large tree * growing in many parts of the East Indies. *Tamarinds* are the produce of a tree † growing also in the East Indies, as well as in Egypt, Arabia, and the West Indies. It rises to a great height, and produces handsome clusters of yellow flowers, streaked with red veins. The fruit, after being taken out of the pods in which it grows, is placed in layers in a cask, and boiling syrup poured over it till the cask is filled, forming an agreeable conserve, which is sometimes employed in medicine.

Of the spice-bearing trees and plants, a large proportion are natives of India and the East Indian islands: the only considerable exception, perhaps, is *allspice*, or *pimento*, the fruit of a tall, handsome, and fragrant species of myrtle ‡, growing wild in the West Indies. The spices of India formed principal articles in that lucrative trade which once enriched successively the Italian republics, the Portuguese, and the Dutch. Before the discovery of the passage round the Cape of Good Hope, these commodities were brought to Europe either by a long and expensive land-carriage, or by way of the

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* Styrax benzoe. † Tamarindus indica.

‡ Myrtus pimenta.

Red Sea and the Nile. The Greeks and Romans consumed great quantities of spice and aromatics, not only when burning incense in their temples, but likewise in burning the bodies of their dead. How ignorant they were of the countries in which these productions are found, and the manner in which they are procured, will appear from the strange account given by Herodotus, the earliest of profane historians, of the manner of obtaining cinnamon. "How or "where this substance grows," he says, "I have "not been able certainly to ascertain; but from "the best information I can get, it appears to "be the produce of those countries in which "Bacchus was nursed. It is said that in Ara-"bia great birds bring this wood (which we, "after the Phœnicians, call cinnamon) into "their nests: these nests are constructed of "clay, and fixed against the faces of steep cliffs, "out of the reach of human feet. The Ara-"bians, in order to obtain the spice, carry the "limbs of oxen, and asses, and other large ani-"mals near the nests, and there leave them; "when the birds fly down and carry up the "meat, whose weight breaks down the nests, "and brings them to the earth*.

We now know that cinnamon is the inner

* Book iii. § 111.

bark of a tree nearly allied to the common Bay-tree*, which grows in the island of Ceylon as abundantly as the Hazel with us. From the leaves of this tree is distilled an essential oil, sold in the shops by the name of *oil of cloves*. Another kind of oil, obtained from the fruit, is extremely fragrant, and is made into candles in Ceylon, for the sole use of the king†. The bark commonly sold in the shops under the name of cinnamon is that of the *Cassia*‡, another tree of the same family, which grows in Sumatra and Java. A third tree§, belonging to the same family, a native of Japan, yields *camphor*, which is procured by distilling the twigs with water. *Ginger* is the root of an herb‖ found in the East Indies, but naturalized in Jamaica, whence we derive a considerable part of our supply of this article. *Pepper* is brought from Malacca, Java, and Sumatra. It is the fruit of a trailing plant¶, remarkable for the simple structure of its blossom. The fruit is a red berry, containing one round seed: this berry, dried and shrivelled, is the *black pepper*

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* Laurus cinnamomum.

† Woodville's Medical Botany.

‡ Laurus cassia.

§ Laurus camphora.

‖ Amomum zingiber.

¶ Piper nigrum.

of commerce. *White pepper* consists of the same berry, stripped of its outer coat. *Nutmegs* and *cloves* were long supposed to be exclusively produced in the Malaccas, or Spice Islands, a cluster of islands in the Indian Ocean, formerly in possession of the Dutch, who monopolized the trade in these spices, and by keeping the market constantly understocked, obtained an extraordinary price for them from the other nations of Europe. For the purpose of rendering their monopoly more complete, they even paid an annual tribute to the sovereigns of some of the smaller islands, as a recompense for allowing all the clove-trees in their dominions to be destroyed. It is now, however, ascertained that this tree grows in New Guinea, and other parts of the East Indian islands. Cloves are the flowers, or rather the buds of a tree*, gathered and dried before the petals open. Nutmegs are the production of a tree† said to resemble a Pear-tree, bearing a fruit of the size of a nectarine, of which the outer part consists of a fleshy covering enveloping the nutmeg in the same manner as the green coat of a walnut. Between the nutmeg and this fleshy covering grows the substance called *mace*.

Although, as I have mentioned, our Euro-

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* Caryophyllus aromaticus. † Myristica officinalis.

pean corn does not succeed within the tropics, several other kinds of grain are plentifully cultivated there. One of these is *Maize*, or *Indian Corn*, which I have already referred to as raised in the south of Europe. It grows to the height of five or ten feet, and produces an ear as large as a cucumber, each grain being of the size of a pea. The quantity of food yielded by an acre of Maize is much greater than by an acre of Wheat or Barley, but the flour produced by it is coarse. This plant is a native of America. Another sort of grain abundantly raised in the torrid zone is called *Millet:* it grows somewhat in the manner of a reed, with a large, loose, feathery head. The seed is small and round, not unlike turnip or cabbage-seed. The appearance of *Rice* and its mode of cultivation have been already described. Besides these, and some other species of grain which it might be tedious to describe, the inhabitants of the tropical regions cultivate a plant called the *Jatropha Manihot*, from the root of which they prepare a kind of bread called *cassava bread*. For this purpose the root is first peeled, and then pressed in a bag made of rushes: the solid part which remains is the substance sold here under the name of *tapioca*, and employed in the torrid zone, as just mentioned, for making bread. It is not a little remarkable, that the juice which

comes away is extremely poisonous, and even employed by some of the Indian tribes for poisoning their arrows, though the portion which remains in the bag is perfectly harmless and nutritious. *Arrow-root* is prepared from the root of another plant*, which grows abundantly in the swamps of Guiana. The inhabitants of the East Indian and South Sea islands are supplied with food by the *Bread-fruit-tree*, which grows to the height of an Oak, and produces a fruit of the size and shape of a young child's head. The substance of this fruit is perfectly white, of the consistence of new bread, and not unlike it in taste, but slightly sweet. Another plant which supplies the people of the torrid zone with food is the *Yam*, a root somewhat like the Potatoe, but of a black colour withinside, and weighing sometimes as much as twenty or thirty pounds.

The mean annual temperature of the equatorial regions is by no means so different from that of other parts of the globe as we might be led to suppose by observing the extraordinary phenomena of tropical vegetation. In a climate where the Bamboo attains in a few months the height of sixty feet;—where the whole aspect of the vegetable world exhibits so sin-

* Maranta arundinacea.

lar and striking an aspect,—we naturally expect to find as marked an increase in the heat of the sun's rays. This, however, is not the case. There is no reason to believe that the mean temperature at the equator exceeds 82°, a degree of warmth by no means very uncommon in our own country. The mean temperature of Cumana, on the northern coast of South America, in latitude 10° 27′, is 82°; that of Havannah, the capital of the island of Cuba, in latitude 23° 10′, is 78°; that of Madras, in latitude 13° 5′, is 81°; that of Manilla, the principal of the Philippine islands, in latitude 15°, is 78°. In fact, the climate of most parts within the tropics is more remarkable for equability than for extreme heat. Twice in the year the sun is vertical to every place lying within the torrid zone; therefore every place so situated should have two summers in twelve months, and of course two winters. But, in fact, the difference of temperature at different seasons is so trifling in these regions, as scarcely to attract attention: at Cumana, for instance, the mean temperature of the winter is 80¼°; that of the three hottest months only 83½°. The different seasons are marked by circumstances far more striking than this slight difference of temperature. From the time when the sun becomes vertical in its passage towards the tropic till it again

becomes vertical in returning towards the equator, (that is, during the time answering to summer in the temperate zone,) the country, in most parts of the tropical regions, is deluged with almost continual rain, while the other part of the year is a season of fine weather.

A similar equability of climate is found to prevail in those districts which are situated far above the level of the sea, but of course accompanied by a lower temperature. Thus the mean temperature of Quito, directly under the equator, at a height of eight thousand feet, corresponds nearly with that of the South of France; but the lowest point which the thermometer has been observed to indicate at Quito is 42°; whereas at Marseilles, though the climate there is less liable to great fluctuations than in most places under the same latitude, the mercury sinks occasionally as low as 23°*. The temperature of that great elevated plain which occupies the western side of the continent of South America resembles a perpetual spring; and as very little difference is felt in the warmth of the different seasons, the gradual diminution of heat from the level of the sea upwards is more distinctly observable than in other cli-

* These temperatures are all taken from Humboldt's Lignes Isothermes.

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Cacao, Indigo, and Coffee.
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the region of the *Cinchona*,
ields that well-known and valu-
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* Humboldt: Geographie der Pfl

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